

Alta Fescue Production in Oregon

H. H. RAMPTON



Oregon State System of Higher Education, Agricultural Experiment Station,
Oregon State College, Corvallis,
and
Bureau of Plant Industry, Soils and Agricultural Engineering,
United States Department of Agriculture, Cooperating

Illustration on Cover—

Figure 1. A single plant of Alta fescue.

TABLE OF CONTENTS

	Page
Introduction	5
Description	6
Adaptations in Oregon	7
Climatic	7
Soils	7
Seedbed Preparation	7
For Seed Production	7
For Forage	8
Planting	8
Time of Planting	8
Methods of Planting	9
Rates of Planting	9
Seed Quality	9
Utilization and Management	10
Pasture	10
Hay	14
Weed Control Possibilities	14
Fertilization	16
Eradication	17
Seed Production	18
General	18
Harvesting and Cleaning	19
Markets	21
Pests	21
Diseases	21
Insects	22
Rodents	22

SUMMARY

Alta fescue is an improved strain of tall fescue. It is closely related to meadow fescue but is longer lived and is a better forage producer.

Alta fescue is an extremely popular grass, chiefly because of its excellence in pastures. Its outstanding qualities are: high yields of forage, a long growing season, deep roots by which deep subsoil moisture is utilized for green growth throughout the summer, wide adaptations, and long life.

Alta fescue is generally adapted for forage production where the annual rainfall is 15 inches or more and where the elevation is under 5,000 feet. The general requirements for seed production are an annual rainfall of at least 18 inches and an elevation not greater than 3,000 feet.

Alta fescue is adapted to growing on heavy lands and will tolerate poorly drained conditions. It thrives on quite acid soils and is tolerant of moderate alkali concentrations. It is an excellent soil improver because of the organic matter supplied by the extensive root system.

Clean seedbeds are important when plantings are being made for seed production. The use of seed containing weed seeds, especially those that are noxious in agricultural seeds, should be strictly avoided when planting for seed production.

Most seed of Alta fescue is grown in solid stands. Culture in cultivated rows is recommended for the production of seed of the best quality and for highest seed yields.

Alta fescue requires plentiful supplies of plant nutrients, especially nitrogen, for continued high production of both forage and seed.

The seed crop is harvested and threshed with standard types of farm machinery as used for cereals and other grass seed crops.

Alta Fescue Production in Oregon

By

H. H. RAMPTON*

INTRODUCTION

ALTA fescue is an improved strain of tall fescue and is closely related to meadow fescue. It was originated as a plant selection by the Oregon Agricultural Experiment Station in cooperation with the Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, United States Department of Agriculture.† All of the Alta fescue in use in Oregon at the present time is believed to be of this improved strain as developed and distributed by the Oregon Agricultural Experiment Station and the United States Department of Agriculture.

The first seed-increase planting in Oregon was made in 1932 on the Oregon Agricultural Experiment Station. The initial commercial seed harvest took place in 1936, and since that time production has continually increased.

The extreme popularity of Alta fescue in Oregon is based chiefly on its excellence in pastures. The outstanding qualities of the grass are: high yields of palatable forage, a long growing season, deep roots that allow the plant to utilize deep subsoil moisture for green growth throughout the summer, wide adaptations, and long life.

No definite information is available on the present acreage of Alta fescue for forage and seed production purposes in Oregon. Many plantings have been made for forage in which Alta fescue is included in mixture with other plants. Most fields that are harvested for seed are used incidentally for forage after the seed is harvested. The total acreage in Oregon for all purposes probably exceeds 50,000 acres and is increasing rapidly.

* Associate Agronomist, Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, Cooperating with Oregon Agricultural Experiment Station. Forage crop work at the Oregon Agricultural Experiment Station is conducted in cooperation with the Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, and credit is hereby acknowledged as jointly due to the above-named division and the Oregon Agricultural Experiment Station.

† The selection was made in 1923 from a four-year-old stand of tall fescue by H. A. Schoth, Senior Agronomist.

Data on seed production for the years 1938 to 1944 inclusive are shown in Table 1.

Table 1. PRODUCTION OF ALTA FESCUE SEED IN OREGON, 1938-1944, INCLUSIVE

Year	Crop acreage	Average yields per acre	Total yield
	<i>Acres</i>	<i>Pounds</i>	<i>Pounds</i>
1938	70	321.4	22,500
1939	150	156.6	23,500
1940	750	320.0	240,000
1941	1,250	185.6	232,000
1942	1,500	180.0	270,000
1943*	2,000	202.5	405,000
1944*	3,000	166.6	500,000

* The figures shown are estimates.

DESCRIPTION

Alta fescue is known botanically as *Festuca elatior* var. *arundinacea* (Schreb.) Wimm. The plant is a deep-rooted, tufted, long-lived perennial grass having numerous dark green basal leaves and comparatively few seed stalks; it attains heights of 3 to 4½ feet. The branched or panicle type heads are 4 to 12 inches long. The seeds are borne three to five in a spikelet, short-awned, about the size and shape of ryegrass seeds, distinctly veined on the back, and somewhat dark in general appearance on account of a slight purple tinge on the glumes or chaff and the dark purple color of the caryopsis or kernel.

Under conditions in the Pacific Northwest, Alta fescue is taller and more robust, higher in forage yield, and much longer lived than meadow fescue, *Festuca elatior* L.

Alta fescue in old stands develops a uniform sod. The roots of the plants are numerous, coarse, and normally penetrate to a depth of 5 feet or more in soils that are moist throughout their entire depth during at least a portion of the year. It has a long growing season and is one of the few grasses that remain green throughout the summer in western Oregon. Hay and seed fields produce considerable aftermath after harvest. Winter growth is almost continuous in western Oregon. Recovery is particularly rapid in the spring and after the first fall rains.

Alta fescue grows slowly in the seedling stage and usually requires one full growing season to become established. During this time its production of forage is small.

Several improved strains of *Festuca elatior* var. *arundinacea* have been developed in other places, but to date none of these has been equal to Alta fescue where tested in Oregon.

ADAPTATIONS IN OREGON

Climatic

Alta fescue has wide climatic adaptations. It performs well in the Willamette Valley, southern Oregon, the humid coastal section, and in the irrigated and higher rainfall areas east of the Cascade Mountains. It is very winter-hardy. Alta fescue is generally adapted for forage production where the annual precipitation is 15 inches or above and when the elevation is not more than 5,000 feet. For seed production the general requirements are a yearly precipitation of at least 18 inches and an elevation not greater than 3,000 feet. Alta fescue production is at present centered in the Willamette Valley of western Oregon. Union and Umatilla counties in eastern Oregon are gaining in importance as seed producing areas.

Soils

Alta fescue grows on a diversity of soils. It prefers fertile, moist, rather heavy land, but will thrive on most Oregon soil types excepting those that are extremely light. Alta fescue grows on very heavy lands, and the roots are able to penetrate dense subsoils. The grass will tolerate poorly drained conditions and will survive in standing water for long periods during the winter when the plants are semi-dormant. Long submergence during the growing season is likely to be injurious. Alta fescue is known to be tolerant of moderate alkali concentration when soil moisture conditions are favorable; it will thrive also on quite acid soils. The grass is a high producer of forage and seed on fertile lands. On soils of low fertility forage growth is usually satisfactory but seed production is usually low. There are large areas of poorly drained lands of low fertility, particularly of the Dayton, Cove, and Wapato series, in western Oregon where Alta fescue is comparatively well-adapted for forage production.

Alta fescue is an excellent soil improver, especially for heavy lands, because of the action of the roots in "opening up" the soil below plow depth and the large amount of organic matter that accumulates as a result of partial renewal of the root system each year.

SEEDBED PREPARATION

For seed production

Alta fescue makes slow growth during the first year; consequently, a clean seedbed is desirable for most rapid establishment. A clean seedbed is advantageous also in reducing the population of ryegrass and other plants bearing seeds that are difficult to separate from

Alta fescue seed. For fall planting, spring-plowed and summer-fallowed land may be used, but the most common procedure is to prepare a seedbed on land that has grown a cultivated crop or a spring-sown grain crop. This practice eliminates many weeds. Shattered grain should be allowed to sprout and then be destroyed by cultivation before planting the grass. When Alta fescue is fall-planted following a fall-sown and summer-harvested crop, the stand may be considerably thinned or weakened by weed competition during the first year, and the purity of the succeeding seed crops lowered.

Seedbeds for spring planting should be plowed early in the spring and worked into a fine, firm, weed-free condition. On lands that are subject to blowing, excessive soil rolling is to be avoided.

For forage

Seedbeds for plantings to be used as forage on cultivated lands are prepared by the same general methods as for seed production plantings, except that the elimination of weeds and volunteer crop seedlings is not so essential as when plantings are made for seed production. Young stands of Alta fescue may be seriously thinned, however, by heavy growth of volunteer grain, vetch, ryegrass, and weeds.

On rough, stony, or stumpy land, seedbed preparation is often difficult. Land having considerable amounts of logs, stumps, slash, brush, or weeds may be put into seedbed shape for grass planting by burning. Burning and subsequent seeding on the ashes is usually best done in the fall. When the making of a seedbed by burning or by the use of machinery cannot be accomplished, there is little chance of successfully establishing stands. Soils heaved by frost are sometimes in fairly satisfactory seedbed condition for late winter broadcast planting.

PLANTING

Time of planting

Alta fescue may be either fall or spring planted.

Fall planting is usually practiced in western Oregon under most conditions except on cultivated hill soils that heave badly during frosty periods. Fall planting may be done in eastern Oregon on soils that are not subject to excessive wind or water erosion. The period for fall planting usually extends from September 10 to October 15.

Spring plantings are generally made during March, April, and May. Spring seedings are often made on lands that heave or erode

in the winter and in cold dry regions. Row plantings are almost invariably made in the spring.

Methods of planting

Drilling is preferable to broadcasting because uniform stands are more easily obtained. Broadcasting the seed evenly, followed by light harrowing, is a satisfactory method of planting. The depth of planting should not be more than 1 inch.

Alta fescue plantings, especially those for seed production purposes, are usually planted without a nurse crop. Good stands are often obtained by fall planting with winter barley or wheat, but thin or spotty stands often result when heavy growth of volunteer grain, vetch, or ryegrass occurs. Spring planting with a nurse crop of spring grain is satisfactory with irrigation.

Alta fescue for seed production is often planted in cultivated rows spaced $2\frac{1}{2}$ to $3\frac{1}{2}$ feet apart. This method is recommended for the production of seed of high purity and for maintaining high seed yields, particularly in dry regions and on the less productive soils. Row plantings are usually made with single or multiple row planters, beet and bean planters, or the ordinary grass seed or grain drill with all feed cups plugged except those placed at the desired planting intervals.

Rates of planting

The recommended rate of planting Alta fescue alone in solid stands on cultivated land is 10 to 12 pounds an acre for seed production and 14 to 18 pounds of seed an acre for forage. When planted for forage in mixture with other plants, the rate may vary from 2 to 16 pounds an acre.

When planted in rows spaced 3 feet apart, 3 to 5 pounds of seed an acre are required.

Seed quality

When planting Alta fescue for seed production purposes, only seed of high quality should be used. The use of seed containing weed seeds, especially those that are noxious in agricultural seeds, should be strictly avoided. Other objectionable seeds in mixtures are: orchard grass, the ryegrasses, tall meadow oatgrass, cheat, and sorrel.

Oregon-grown Alta fescue seed that has been well-matured and properly handled has an average germination of approximately 95 per cent. Low germination is usually the result of harvesting when the seed is too immature, or of loss of vigor on account of age. Well-

matured new seed having 95 per cent germination should be about 85 per cent viable when 2 years old and stored under favorable conditions.

UTILIZATION AND MANAGEMENT

Pasture

Alta fescue is often better-suited for pasture than for hay because of its numerous basal leaves. It is a heavy yielder of forage and has a long growing season. In comparison with ryegrass, Alta fescue makes as much winter growth and produces considerably more spring, summer, and fall forage. The grass is quite palatable to livestock. The foliage has a tendency to become somewhat coarse and tough with age, and is most readily consumed when the leaves are in a young succulent condition. It responds well to plentiful nitrogen in the soil, which is usually supplied most economically by planting in combination with an adapted legume. Under general conditions on the unirrigated lands of western Oregon, subterranean clover of either the Mt. Barker midseason strain or Tallarook late strain performs well in combination with Alta fescue. On lands of good fertility and good summer moisture holding capacity, white clover or birdsfoot trefoil, *Lotus corniculatus*, may be used. In

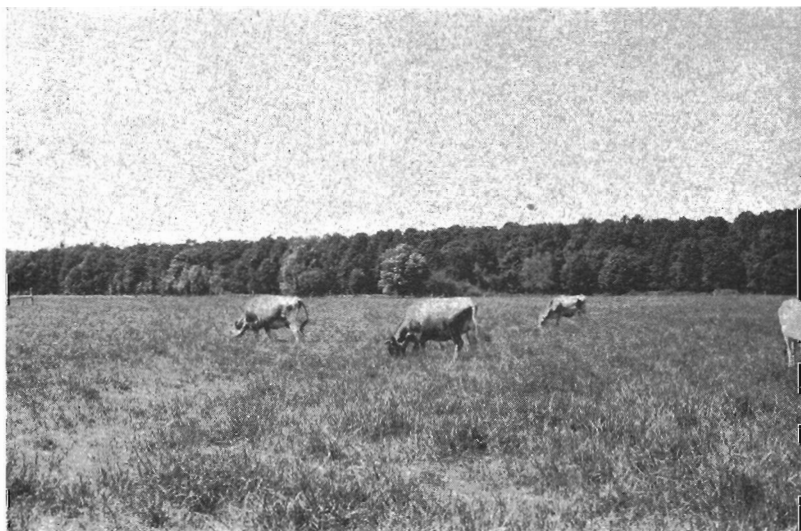


Figure 2. Alta fescue pasture on farm of Linn County, Oregon, dairyman. This pasture was carrying two cows per acre.

southern Oregon birdsfoot trefoil should be a suitable companion legume for Alta fescue. For bottom lands along the coast, big trefoil, *Lotus uliginosus*, can be used successfully. On the coastal uplands big trefoil, birdsfoot trefoil, and midseason or late subterranean clovers are used in combination with Alta fescue. On irrigated lands, both ladino clover and ordinary white clover are desirable legumes for use with Alta fescue in pastures. Where legumes do not thrive in mixture with Alta fescue, fertilization with nitrogen is generally necessary to maintain high forage production.

Alta fescue is better-suited than most grasses for growing in pure stands because of its long life and aggressiveness. The better practice, however, is to use it as a major component of a permanent pasture mixture containing a legume. The following pasture mixtures, based on experimental evidence and farmer's experiences, are recommended:*

FOR WILLAMETTE VALLEY SECOND BENCH LANDS (WELL DRAINED)

		<i>Pounds per acre</i>
No. 1	Alta fescue	8
	Perennial ryegrass	6
	Orchard grass	4
	Subterranean clover, either Mt. Barker or Tallarook	3
	Total seed	21

		<i>Pounds per acre</i>
No. 2	Alta fescue	12
	Perennial ryegrass	6
	Subterranean clover, either Mt. Barker or Tallarook	3
	Total seed	21

		<i>Pounds per acre</i>
No. 3	Alta fescue	16
	Subterranean clover, either Mt. Barker or Tallarook	3
	Total seed	19

FOR WILLAMETTE VALLEY FIRST BENCH LANDS (POORLY DRAINED) INCLUDING WAPATO AND COVE SWALES

		<i>Pounds per acre</i>
	Alta fescue	12
	Perennial ryegrass	6
	White clover and alsike clover (about 50-50 mix)....	2
	Total seed	20

* Most of these mixtures have been formulated for use under normal seed prices. When seeds are high in price the amounts of seed per acre as recommended may be reduced, although better results can be expected to follow the use of the recommended planting rates.

FOR WESTERN OREGON FERN LANDS

	<i>Pounds per acre</i>
Alta fescue	8
Common ryegrass	4
Orchard grass	3
Red fescue	2
Highland bentgrass	1
Subterranean clover, Mt. Barker	3
	<hr/>
Total seed	21

FOR WILLAMETTE VALLEY HILL LANDS (EITHER
CULTIVATED OR LOGGED-OFF AND BURNED)

	<i>Pounds per acre</i>
Alta fescue	8
Perennial ryegrass	4
Orchard grass	2
Red fescue	2
Highland bentgrass	1
Subterranean clover, Mt. Barker	3
	<hr/>
Total seed	20

FOR LOGGED-OFF AND BURNED AREAS ON MOIST
WESTERN SLOPE OF COAST RANGE

	<i>Pounds per acre</i>
Alta fescue	6
Perennial ryegrass	4
Red fescue	3
Meadow foxtail	2
<i>Lotus uliginosus</i> and white clover (50-50 mix)	2
or subterranean clover, Tallarook	3
	<hr/>
Total seed	17 or 18

FOR IRRIGATED PASTURES

	<i>Pounds per acre</i>
No. 1 Alta fescue	4
Perennial ryegrass	4
Meadow foxtail	4
Ladino clover	3
(or <i>Lotus uliginosus</i> near the coast)	2
	<hr/>
Total seed	14 or 15

	<i>Pounds per acre</i>
No. 2 Alta fescue	4
Orchard grass	4
Perennial ryegrass	4
Ladino clover	3
	<hr/>
Total seed	15

FOR EASTERN OREGON MEADOWS WITH
DEEP, WELL-DRAINED SOILS

	<i>Pounds per acre</i>
Alta fescue	2
Smooth bromegrass	2
Tall meadow oatgrass	2
Timothy	2
Ladak alfalfa	1
or White clover	$\frac{1}{2}$
Total seed	8 $\frac{1}{2}$ or 9

FOR EASTERN OREGON MEADOWS WET IN SPRING

	<i>Pounds per acre</i>
Alta fescue*	4
Meadow foxtail	1
Redtop	1
or Nevada bluegrass	2
Alsike clover	1
Total seed	7 or 8

Newly established Alta fescue should be pastured with care during the first year to avoid pulling or weakening the young plants.



Figure 3. Buck lambs pasturing without supplemental feed, on Alta fescue after the seed crop harvest. The lambs were turned in on September 15. This photograph was taken in the late fall.

* Bluestem wheatgrass *Agropyron smithii* Rydb. may be used instead of Alta fescue if seed is available.

The stubble remaining after removal of the seed crop usually yields considerable pasture that can be well-utilized by cattle, horses, or sheep. Analyses of Alta fescue stubble sampled during midsummer have shown it to contain about 3.8 per cent crude protein. Pasturing is usually discontinued in the late fall on seed-producing fields to avoid reduction of the following year's seed yields. Excessive winter pasturing may result in soil puddling and growth of weeds.

Hay

Alta fescue is a high yielding hay grass, particularly on fertile bottom lands where leaf growth is extremely heavy. Seed fields are sometimes cut for hay when the prospects for a profitable seed crop are unfavorable. Hay yields on farms have ranged from 1 to 2 tons an acre. Experimental results show that higher yields may be obtained. Table 2 shows Alta fescue to have the highest average hay yield, over a six-year period, of all forage grasses tested at the Eastern Oregon Livestock Experiment Station at Union. Table 3 shows comparative green forage yields of Alta fescue and other grasses on the Oregon Agricultural Experiment Station at Corvallis. The second cutting yields in 1942 and 1943 indicate the ability of Alta fescue to make regrowth during the summer. Considerable summer recovery was made in 1944 also, but yields were not taken.

Table 2. AVERAGE HAY YIELDS OF GRASSES FOR THE SIX-YEAR PERIOD, 1936 TO 1941 ON THE EASTERN OREGON LIVESTOCK EXPERIMENT STATION, UNION.

Species	Yields per acre
	<i>Tons</i>
Alta fescue	4.11
Canada wild rye	3.51
Reed canary grass	2.71
Slender wheatgrass	2.01
Timothy	1.99
Tall meadow oatgrass	1.84
Smooth bromegrass	1.82
Crested wheatgrass	1.68
Orchard grass	1.62
Meadow fescue	1.42
Mountain bromegrass	1.30
Perennial ryegrass	1.06

Seed growers report that threshed Alta fescue straw is relished by livestock and that it appears to have nutritive value. The stubble remaining after removal of the seed crop is often harvested and made into hay.

Weed control possibilities

Alta fescue is believed to possess real possibilities as an aid in perennial weed control because of its deep roots, dense growth, long growing season, and general aggressiveness. No cases of actual

Table 3. ANNUAL AND AVERAGE GREEN FORAGE YIELDS OF GRASSES FOR THE FOUR-YEAR PERIOD, 1941 TO 1944 ON THE OREGON AGRICULTURAL EXPERIMENT STATION, CORVALLIS.

Species	Green forage yields per acre							1944	Average
	1941	1942			1943				
		1st cut*	2d cut	Total	1st cut*	2d cut	Total		
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	
Alta fescue	1.07	16.33	2.62	18.95	16.13	1.59	17.72	9.10	11.71
Tall fescue S. 53	1.16	15.05	1.84	16.89	14.68	1.06	15.74	7.95	10.43
Tualatin meadow oatgrass	1.08	13.91	2.95	16.86	11.77	1.19	12.96	7.11	9.50
Orchard grass—Brage	2.01	13.99	1.90	15.89	11.99	.86	12.85	6.57	9.33
Perennial ryegrass F. C. 22764	4.31	7.83	.84	8.67	4.70	.18	4.88	3.09	5.24
Red fescue F. C. 22688	1.11	8.75	1.23	9.98	8.84	.45	9.29	3.53	5.98
Highland bentgrass—Oregon	1.50	4.05	.67	4.72	7.00	.30	7.30	3.26	4.19
Meadow fescue F. C. 2276260	9.53	.88	10.41	5.38	.48	5.86	†	5.62
Timothy F. C. 2276691	6.20	.65	6.85	4.22	.45	4.67	2.09	3.63
Smooth bromegrass B-4	1.70	11.11	1.62	12.73	8.74	.50	9.24	3.46	6.78
Meadow foxtail	2.78	5.82	1.36	7.18	5.03	.71	5.74	3.84	4.88

* Harvested at hay stage.

† Mostly dead in spring of 1944.

weed eradication have been reported, but observations of good stands of Alta fescue established on areas infested with perennial weeds such as Canada thistle, wild morning glory, and quack grass, have shown that the weeds were usually greatly reduced in growth and formed no seed, especially on lands that became short of moisture in the summer. These three weedy plants have been practically eliminated from lands that have been planted to Alta fescue on the Oregon Agricultural Experiment Station.

Fertilization

Alta fescue in both seed and forage production responds well to liberal applications of nitrogen. The effects of other mineral fertilizers on forage growth and chemical composition are not known. Experimental data on the effects of various fertilizers on seed production are incomplete. Seed growers' observations and preliminary experiment station trial data indicate that for increased seed production on some Oregon soils a combination of nitrogen and phosphorus is better than nitrogen alone. Experienced seed growers usually use at least 150 pounds per acre of 15 to 20 per cent nitrogen fertilizer and enough phosphate fertilizer to supply 30 pounds or more of phosphoric acid. On many Oregon soils, applications of phosphorus and sulphur will materially aid the production and main-



Figure 4. Hay made from stubble and leaves of Alta fescue after the seed crop harvest.

tenance of companion legumes in forage plantings. Potash applications are apparently not generally needed on most Oregon soils where Alta fescue is grown.

Under Oregon conditions, nitrogen-carrying fertilizer is usually applied in the late winter or early spring, or as soon as the grass begins to grow. Nitrogen is sometimes applied twice, either in the fall and early spring or in the early and midspring. Phosphate fertilizers such as superphosphate may be applied in the fall, late winter, or early spring. Applications of fertilizers made after April 15 on unirrigated land are generally much less effective than February or March treatments.

Mineral fertilizers are preferable to barnyard manure for use on seed-producing fields. Barnyard manures are generally too high in weed seed content to be desirable for fertilizing seed crops, although they may be used to advantage on pastures.

Eradication

Alta fescue, though not an aggressively spreading grass, is quite tenacious when once established. The breaking up of Alta fescue fields requires more effort than is needed for many other common grasses such as perennial ryegrass, Chewings fescue, timothy, and orchard grass. Fall-plowed Alta fescue may become partly re-established during the winter in western Oregon. To break the sod successfully, eradicate the grass, and prepare the land for another crop, three principal steps are recommended:

1. Shallow plowing of the sod 3 to 4 inches deep, laying the sod over as completely as possible, at a time when sufficient drying to kill the grass crowns will occur. The best time for this operation is in the early summer or midsummer when the upper soil has become dry and the crop has been removed.
2. Thorough disking at sufficient depth to chop up the turned sod. The use of a heavy roller before disking will crush down the turned sod and improve the condition of the sod for the disking operation.
3. Replowing about 6 or 7 inches deep after all grass is dead, completely burying all dead and decomposing sod, followed by packing with a roller. This operation may be done in the late summer or be delayed until the normal plowing season for the succeeding crop.

For breaking Alta fescue sod, the prairie sod-breaker type plow is recommended. Any general purpose plow with a rather long, gradually turning moldboard is preferable to the stubble plow. The

replowing operation can be accomplished with a general-purpose plow. Decomposition of the sod and growth of the following crop are greatly stimulated by the application of 100 or 150 pounds an acre of 15 to 20 per cent nitrogen fertilizer at planting time.

A wide variety of crops may be used to follow Alta fescue. Crops especially recommended are: Willamette vetch, Austrian winter field pea, winter grain, red clover, alsike clover, spring grain, flax, or cultivated crops such as field corn or crops for cannery use.

SEED PRODUCTION

General

Alta fescue for seed production should be planted only on clean land. The presence of Canada thistle, Russian knapweed, white top, quack grass, and other noxious weeds in seed fields usually increases cleaning expenses or may make the crop unsalable on account of the presence of noxious weed seeds. Other plants that are objectionable are: orchard grass, tall oatgrass, ryegrass, and cheat.

The length of time an Alta fescue planting may remain in profitable seed production is variable. Well-managed seed fields have been known to produce 6 successive paying crops, but 3 to 4 profitable seed crops are usually obtained. On soils of low fertility, the period



Figure 5. A good seed crop of Alta fescue. This four-year-old stand was broadcast planted.

of profitable production is usually short. Heaviest production usually occurs in the first and second crops. Yields of seed have varied from 50 to 1,200 pounds an acre. The yearly average acre yield in Oregon, as shown in Table 1, has varied from 156.6 to 321.4 pounds of seed.

Most Alta fescue seed is grown in solid stands. The cultivated row method is gaining in popularity with most growers planting in rows spaced about 30 inches apart. Experimental evidence indicates that highest seed yields are obtained when the rows are spaced between 3 and 4 feet apart. Growers use the 30 inch spacing because their cultivating and harvesting machinery can be adapted to it easily. Experimental yields of Alta fescue seed grown in rows and in solid stands on the Oregon Agricultural Experiment Station at Corvallis are shown in Table 4.

Table 4. YEARLY AND FIVE-YEAR AVERAGE SEED YIELDS OF ALTA FESCUE GROWN IN ROWS OF DIFFERENT WIDTHS AND IN SOLID STANDS AT CORVALLIS.

Culture method	Seed yields per acre					
	1940	1941	1942	1943	1944	Average
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
2 foot rows	771	267	372	180	141	346
3 foot rows	939	354	497	325	146	452
4 foot rows	857	491	558	398	77	476
Solid stand	1,129	198	240	132	170	374

The row culture method has certain advantages, in that higher seed yields are usually obtained, cleaner seed is generally produced, profitable seed production is usually maintained longer, and seed crops can be grown under less favorable conditions than when grown in solid stands.

Little is known about the influence of irrigation on Alta fescue seed production.

Pasturing of seed fields is often done in the late summer and fall. Pasturing during the late winter and spring is likely to be detrimental to the developing seed crop.

Harvesting and cleaning

Alta fescue seed is ready to harvest if a few seeds drop into the palm of the hand when the seed head is pulled gently between the thumb and forefinger. At this stage of maturity, most of the seeds will have reached the hard-dough stage, and the kernels will be dark purple in color. Ripe Alta fescue seed shatters easily. When the crop has reached the desired stage of maturity, harvesting should be done as quickly as possible to avoid excessive seed loss by shattering.

Cutting is usually done with a grain binder. The bundles are placed in medium-sized shocks to cure. Some seed growers equip their binders with removable pans placed beneath the draper rolls and a box in place of the bundle carrier to catch shattered seed.

The cured bundles will drop much seed when being hauled to the thresher. The use of racks or slips with tight beds or canvas covers will save most of this shattered seed.

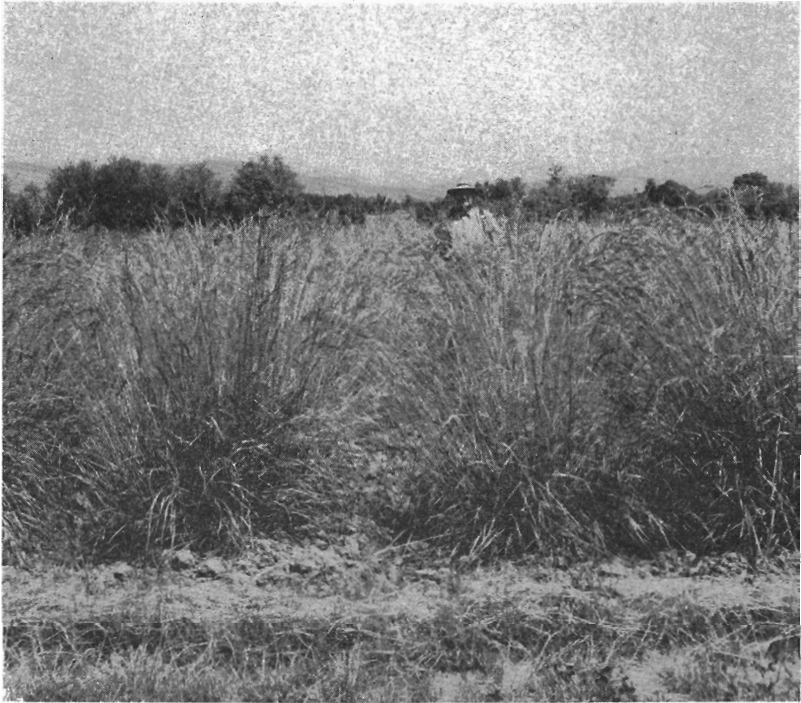


Figure 6. Alta fescue planted in rows for seed production.

Threshing is usually done with the stationary thresher. The methods correspond closely to those used for perennial and common ryegrass. Adjustments of threshers for Alta fescue threshing are easily made. In general the air vents should be opened slightly, the top screen in the shoe closed far enough to remove the straw, and both screens in the shoe set at a comparatively gentle slope. High cylinder speed and too many concaves may result in chopping of the straw and seed dehulling. When the weather is dry and the seed is well-cured, the toothed concaves may be replaced by blanks. Sheets

of burlap or canvas should be used to catch seed that may sift to the ground through openings in the thresher.

Alta fescue is seldom harvested with combines. Growers sometimes combine the standing crop if seed maturity has advanced so far that excessive seed loss by shattering would result if harvested by the usual method. Seed harvested in this way should be spread out on a tight floor in a well ventilated place and stirred occasionally until dry to prevent sweating or heating.

Equipment for cleaning Alta fescue seed is similar to that used for ryegrass seed. Generally, Alta fescue seed grown under favorable conditions contains comparatively few weed seeds. Such seed can often be satisfactorily cleaned with a properly equipped fanning mill. Seed containing considerable impurities may require running through such special machines as the revolving disk, the sizer, or the vibrator. Crop seeds such as orchard grass, tall oatgrass, ryegrasses, and Chewings fescue are very difficult to remove from Alta fescue seed.

High quality seed should be free from noxious weed seeds, should be of high purity, and should have at least 90 per cent germination. The seed usually weighs between 22 and 27 pounds per bushel. There are about 225,000 seeds per pound.

Markets

Wide markets for Alta fescue seed are developing. Experimental results indicate that the grass is valuable as a forage plant under a great variety of conditions in both eastern and western sections of the United States. Alta fescue appears to thrive and out-yield meadow fescue, orchard grass, and perennial ryegrass throughout the areas in which the latter three grasses are used. It is longer-lived than meadow fescue and perennial ryegrass. The future market for Alta fescue seed will probably be chiefly domestic, even though exports have been made in connection with the war effort.

PESTS

Diseases

No serious diseases are known to affect Alta fescue in Oregon. A very mild leaf spot occurs to some extent on the foliage. Alta fescue is highly resistant to crown rust and *Helminthosporium* net blotch, whereas meadow fescue is very susceptible to both diseases. Ergot is occasionally observed in the developing seed heads.

Insects

Insects are seldom destructive to Alta fescue in Oregon. Cutworms, slugs, and grasshoppers may damage or destroy seedlings. Grasshoppers may cause reduced forage and seed yields. These insects can be controlled by the use of poisoned baits. Aphids sometimes form honeydew on the seeds that may cause difficulty in handling until it dries and crystallizes.

Rodents

Gophers, moles, graydigger squirrels, and rabbits may be destructive to new plantings of Alta fescue. Gophers can be controlled by trapping or poisoning. Rabbits and graydigger squirrels are controlled by the use of poisoned baits. Moles can be eliminated only by trapping. Rodents are seldom troublesome in old established fields where the heavy sod seems to discourage their burrowing activities.

Information about rodent control is given in Oregon State College Extension Bulletin 629.